PATENT
TS1407 (US)
CML:EM

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND INTERFERENCES

In re application of	)	
	)	
ANNE BOER and	)	
FRANCISCUS J. M. SCHRAUWEN	)	Confirmation No.: 1421
	)	
Serial No. 10/587,433	)	Group Art Unit: 1797
	)	
Filed July 26, 2006	)	Examiner: Natasha E. Young
	)	
HEAT-EXCHANGER FOR CARRYING OUT	)	May 22, 2009
AN EXOTHERMIC REACTION	)	
	)	

COMMISSIONER FOR PATENTS
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

APPEAL BRIEF

Applicants hereby submit this Appeal Brief in order to appeal the Final Rejection of claims 1-18 in the Office Action mailed December 24, 2008. Please charge any fees that are necessary in connection with the filing of this brief to Shell Oil Company Deposit Account No. 19-1800.

Real Party in Interest

The real party in interest is Shell Oil Company.

Related Appeals and Interferences

To the best of the undersigned's knowledge, there are no related appeals or interferences.

Status of the Claims

Claims 1-18 were finally rejected in the Office Action mailed December 24, 2008 and are on appeal. Claim 19 was previously canceled.

Status of Amendments

An amendment was submitted in this case on March 24, 2009. In an Advisory Action mailed April 3, 2009, the Examiner indicated that the proposed amendments would be entered for purposes of this appeal. No subsequent amendments have been submitted.

Summary of the Claimed Subject Matter

The application currently contains three independent claims, claims 1, 9 and 17.

Claim 1 is directed to a removable cooling module for use in a reactor carrying out an exothermic reaction. The structure of the cooling module comprising a coolant feed tube, a distribution chamber, a plurality of circulation tubes, and a collection chamber is discussed in the specification at page 7, line 1 to page 8, line 23 at page 12, line 32 to page 16, line 10. The coolant feed tube has at its first end an inlet that is adapted to be removably connectable to a charge pipe and the outlet of the collection chamber is also adapted to be removably connected to a discharge pipe. The definition of removably connectable is set forth in the specification on page 6, lines 26 to 33. Finally, the claim indicated that the inlet and the outlet can be disconnected without the use of a cutting means. On page 9, lines 18 to 27 of the specification, it is taught that the inlet and outlet may also be connected by a fixed joint such as a welded joint which may be opened for instance by an oxy-acetylene cutter. However, the removably connectable joints are preferred and are required by claim 1.

Claim 9 is directed to a reactor for carrying out an exothermic reaction, the reactor comprising a reactor shell and at least one removable cooling module. The reactor is discussed in the specification on pages 17, lines 11 to 23. As discussed above, the structure of the cooling module is discussed in the specification on page 7, line 1 to page 8, line 23, and page 12, line 32 through page 16, line 10. Claim 9 includes the limitation that the coolant feed tube and the

collection chamber outlet are both located towards the same end of the cooling module and can be disconnected without the use of a cutting means. The method of disconnecting the cooling module is discussed on page 6, lines 26-33 and page 9, lines 18 to 27 of the specification.

Claim 17 is directed to a method for carrying out an exothermic reaction comprising the steps of charging a reactor with reactants, cooling the contents of the reactor and removing products from the reactor. The method is discussed generally on page 12, lines 6 to 18 and on page 22, line 24 to page 23, line 2. One particular exothermic reaction is the Fischer-Tropsch synthesis which is discussed on page 21, line 6 to page 22, line 18 and on page 23, line 3 to page 26, line 7. Claim 17 requires that the cooling be carried out using at least one cooling module comprising a coolant feed tube, a distribution chamber, plurality of circulation tubes and a collection chamber. As discussed above, the structure is discussed in the specification at page 7, line 1 to page 8, line 23 and page 12, line 32 to page 16, line 10. Finally, the inlet of the distribution chamber is adapted to be removably connectable to a charge pipe and the outlet is adapted to be removably connected to a discharge pipe such that they can be disconnected without the use of cutting means. The limitation of removably connectable is discussed in the specification at page 6, lines 26-33 and the use of a cutting means is discussed on page 9, lines 18 to 27.

Grounds of rejection to be Reviewed on Appeal

In the Final Office Action, claims 1-4, 9, 11-13 and 16 were rejected under 35 USC 103(a) as being unpatentable over Savin et al. (4,060,127) in view of Kummel et al. (3,802,497).

Claim 17 was rejected under 35 USC 103(a) as being unpatentable over Savin et al. in view of Kummel et al.

Argument

Rejection of Claims 1-4, 9, 11-13 and 16 Under 35 USC 103 Over Savin et al. in view of Kummel et al.

The present invention is directed to a removable cooling module for use in a reactor for carrying out an exothermic reaction. Normally, the reactor will contain a plurality of such cooling modules. The cooling modules are designed such that they can be removed from the charge pipe and the discharge pipe without the use of a cutting means so that they can be removed from the reactor for repair or replacement.

In the Office Action, independent claims 1 and 9 were rejected under 35 USC 103 as being unpatentable over Savin et al. in view of Kummel et al. The Savin et al. reference discloses a shell-and-tube heat exchanger. It does not disclose a removable cooling module for use in a reactor as required by claim 1 of the present invention nor a reactor for carrying out an exothermic reaction having at least one removable cooling module located therein as required by claim 9. Additionally, claims 1 and 9 also require that the inlet and outlet be configured such that they can be disconnected without the use of a cutting means. Savin does not disclose a cooling module that can be disconnected from the inlet and outlet and removed without the use of a cutting means.

The Kummel et al. reference is directed to a heat exchanger for cooling gases. A plurality of separate heat exchangers are connected and parallel. The reference does not disclose a removable cooling module that can be used in a reactor. Further, Applicants submit that it does not teach or suggest a method of modifying the Savin et al. reference to provide the claimed invention.

Applicants submit that the Savin and Kummel references neither alone nor together disclose or suggest a removable cooling module that can be used in a reactor for carrying out exothermic reactions. Accordingly, claims 1 and 9 and all claims depending therefrom are patentable over the cited references.

Rejection of Claim 17 Under 35 USC 103(a) as being Unpatentable over Savin et al. in view of Kummel et al.

In the Office Action, claim 17 was rejected under 35 USC 103(a) as being unpatentable over Savin in view of Kummel as noted by the Examiner, neither reference discloses a method for carrying out an exothermic reaction comprising the steps of charging a reactor with reactants, cooling the contents of the reactor and removing the products from the reactor, wherein the cooling is carried out using the cooling module as defined in the claim. As discussed above with respect to claims 1 and 9, the references neither alone nor together disclose or suggest the removable cooling module which forms the basis for the present invention. Accordingly, Applicants submit that claim 17, and claim 18 which depends therefrom, are patentable over the cited references.

Conclusion

Based on the foregoing arguments, Applicants assert that the claims of the present application would not have been obvious in view of the cited references. It is respectfully requested that this appeal be upheld and that the application be sent back to the Examiner for allowance.

Respectfully submitted,

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CLAIMS APPENDIX

1. A removable cooling module having first and second ends, for use in a reactor for carrying out an exothermic reaction, the cooling module comprising
a coolant feed tube; a distribution chamber; a plurality of circulation tubes; and a collection chamber; said coolant feed tube having at its first end an inlet, for charging the coolant module with coolant, and communicating with said distribution chamber at its second end; each of said circulation tubes communicating with the distribution chamber through a first end and communicating with said collection chamber through a second end; the collection chamber having an outlet for discharging coolant; wherein the inlet and the outlet are both located towards the same end of the cooling module , wherein the inlet is adapted to be removably connectable to a charge pipe and the outlet is adapted to be removably connectable to a discharge pipe, wherein the inlet and outlet can be disconnected without the use of a cutting means.

2. A cooling module according to claim 1 wherein the second end of the coolant feed tube forms the distribution chamber with the circulation tubes connected thereto.

3. A cooling module according to claim 1 wherein the coolant feed tube is located substantially centrally with respect to the circulation tubes.

4. A cooling module according to claim 3 wherein the coolant feed tube protrudes through the collection chamber.

5. A cooling module according to claim 1 comprising between about 20 and about 4,000 circulation tubes.

6. A cooling module according to claim 1 wherein each of the cooling tubes has a length of about 4 to about 40 metres.

7. A cooling module according to claim 1 wherein the diameter of each circulation tube is from about 1 to about 10 cm.

8. A cooling module according to claim 1 having a square, triangular, rectangular, trapezoidal or hexagonal cross section.

9. A reactor for carrying out an exothermic reaction, said reactor comprising a reactor shell an inlet for introducing reactants into the reactor shell an outlet for removing products from the reactor shell; and at least one removable cooling module having first and second ends, for use in a reactor for carrying out an exothermic reaction, the cooling module comprising a coolant feed tube; a distribution chamber; a plurality of circulation tubes; and a collection chamber; said coolant feed tube having at its first end an inlet, for charging the coolant module with coolant, and communicating with said distribution chamber at its second end; each of said circulation tubes communicating with the distribution chamber through a first end and communicating with said collection chamber through a second end; the collection chamber having an outlet for discharging coolant; wherein the coolant feed tube inlet and the collection chamber outlet are both located towards the same end of the cooling module and can be disconnected without the use of a cutting means.

10. A reactor according to claim 9 wherein the inlet is adapted to be removably connectable to a charge pipe and the outlet is adapted to be removably connectable to a discharge pipe.

11. A reactor according to claim 9 in which the coolant feed tube protrudes through the collection chamber.

12. A reactor according to claim 9 in which the reactor comprises between 4 and 100 cooling modules.

13. A reactor according to claim 9 wherein the reactor shell comprises an access for accessing the cooling module.

14. A reactor according to claim 9 further comprising a support for supporting the cooling module.

15. A reactor according to claim 9 wherein the inlet comprises a sparger.

16. A reactor according to claim 9 wherein the outlet comprises a filter.

17. A method for carrying out an exothermic reaction comprising the steps of: charging a reactor with reactants; cooling the contents of the reactor and removing products from the reactor, wherein cooling is carried out using at least one cooling module comprising a coolant feed tube; a distribution chamber; a plurality of circulation tubes; and a collection chamber; said coolant feed tube having at its first end an inlet, for charging the cooling module with coolant, and communicating with said distribution chamber at its second end; each of said circulation tubes communicating with the distribution chamber through a first end and communicating with said collection chamber through a second end; the collection chamber having an outlet for discharging coolant; wherein the inlet and the outlet are both located towards the same end of the cooling module, wherein the inlet is adapted to be removably connectable to a charge pipe and the outlet is adapted to be removably connectable to a discharge pipe such that they can be disconnected without the use of a cutting means.

18. A process according to claim 17 for the synthesis of hydrocarbons wherein the reactor is charged with syngas.

19. (Canceled)

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None